

REMARKS

In the final Office Action, the Examiner rejects claims 16, 18, and 19 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,853,020 to Yu et al. ("Yu") and rejects claims 1-4, 6, 7, 16, 18 and 19 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication 2003/0151077 to Matthew et al. ("Matthew") in view of U.S. Patent No. 5,663,586 to Lin ("Lin").

By this Amendment, Applicants propose amending claim 16 to improve form. Applicants submit that the features embodied in the amendments to claim 16 were either inherent or substantially included in previously examined claims. Accordingly, these amendments do not raise new issues that require further search and/or consideration and should allow for immediate action by the Examiner.

*Rejection of Claims 16, 18, and 19
Under 35 U.S.C. § 102(e) Based on Yu*

In the previous Office Action, in addition to rejecting claims 16, 18, and 19 under 35 U.S.C. § 102(e) based on Yu, the Examiner also rejected claims 1-3, 6, and 7 under 35 U.S.C. § 102(e) based on Yu. The Examiner withdrew the previous rejections of claims 1-3, 6, and 7 based on Yu, apparently in view of Applicants' arguments that Yu does not disclose "a gate formed over the fin and the first and second sidewall spacers," as recited in claim 1. Claim 16 recited previously included a similar feature of "a gate material layer formed over the fin, the first sidewall spacer, and the second sidewall spacer."

Regarding the withdrawing of the rejection of claim 1 based on Yu but not claim 16, the Examiner states, in the final Office Action: "The applicant's arguments with respect to the 35 U.S.C. § 102(e) rejection based on Yu are persuasive with respect to independent claim 1 but not with respect to independent claim 16. Specifically, although Yu does not disclose claim 1's 'a gate [structure] formed over the fin,' Yu does disclose claim 16's 'a gate material layer formed over the fin'." (Final Office Action, page 6, emphasis in original).

Although Applicants do not agree with the Examiner's interpretation of the "gate material layer," in order to expedite prosecution, Applicants have proposed amending claim 16 to change "a gate material layer" to "a gate."

As discussed in the previous Amendment, Yu does not disclose "a gate formed over the fin," as recited in amended claim 16. In contrast, Yu discloses a fin 210 having a dielectric cap 140. (Yu, Fig. 3 and column 4, lines 14 and 15). Spacers 410 and 420 are deposited around fin 210. (Yu, Fig. 4 and column 4, lines 16-27). Yu further discloses that a silicon gate material 710 is then deposited and planarized so that the gate material "is even with or nearly even with dielectric cap 140." (Yu, Figs. 7 and 8; and column 4 line 65 through column 4, line 13). The gate material 710 of Yu is clearly not formed over the fin, as is recited in claim 1. Instead, as is shown in Figs. 8 and 9A of Yu, gate material 710 is planarized so that it does not extend over fin 210. Extending gate material 710 over fin 210 would electrically couple gates 910 and 920 of Yu. In contradistinction, Yu discloses that "the gates are electrically and physically separated by fin 210." (Yu, column 5, lines 63-65).

For at least these reasons, Applicants submit that Yu does not disclose each element of claim 16, and the rejection of this claim based on Yu should therefore be

withdrawn. At least by virtue of their dependency from claim 16, Applicants submit that the rejections of claims 18 and 19 based on Yu should also be withdrawn.

*Rejection of Claims 1-4, 6, 7, 16,
18 and 19 Based on Matthew and Lin*

In the final Office Action, the Examiner maintained the previous rejection of claims 1-4, 6, 7, 16, 18, and 19 based on Matthew and Lin. Applicants respectfully disagree with the Examiner's rationale for maintaining this rejection and request, for the following reasons, that the Examiner reconsider and withdraw the rejection.

In rejecting independent claims 1 and 16 based on Mathew and Lin, the Examiner contends that Mathew discloses most of the features of these claims, but concedes that Mathew does not disclose sidewall spacers having the width recited in these claims. (Final Office Action, pages 3 and 5). The Examiner contends, however, that Lin discloses sidewall spacers having the claimed width and that one of ordinary skill in the art would have found it obvious to combine Mathew and Lin.

Additionally, Applicants submit that the Examiner has not shown proper motivation to combine Mathew and Lin in the manner suggested. The Examiner relies on Lin for the width of the sidewall spacers recited in claim 1, and states that "[I]t would have been obvious to one skilled in this art to form Mathew's polysilicon sidewall spacers with a width of about 150 Å to about 1000 Å because Lin teaches that polysilicon sidewall spacers are conventionally formed that thick." (Final Office Action, page 4). Applicants respectfully disagree with the Examiner's conclusion of obviousness. Mathew discloses a vertical double gate semiconductor device in which a silicon fin layer extends vertically from the substrate of the device. Lin discloses a more conventional FET device. (Lin, see Title and Abstract). Applicants submit that

these two structures would be recognized by one of ordinary skill in the art as different types of semiconductor FET structures and that specific parameters (such as the width of a spacer) in one device could not simply be applied to the other device. Accordingly, one of ordinary skill in the art reading Lin would not be motivated to use the spacer width disclosed by Lin as the width of the floating gate disclosed by Mathew. Thus, Applicants submit that the Examiner has not made a *prima facie* case of obviousness with regard to Mathew and Lin.

An argument similar to the one given above was made by Applicants in the previous Amendment. In response, in the final Office Action, the Examiner states "Mathew and Lin are both directed to insulated gate field effect transistors (IGFETs) comprising gate sidewall spacers, so one of ordinary skill in the art would have been applied Lin's IGFET gate sidewall spacer width teaching to Mathew's IGFET gate sidewall spacer, particularly insofar as Mathew does not disclose the width of its IGFET gate sidewall spacer." (Final Office Action, page 7).

In response, Applicants submit that a FET and an IGFET are broad terms in the semiconductor art. There are many different types of IGFETs. Although both Lin and Mathew disclose IGFETs, the IGFETs of Lin and Mathew are significantly different from one another. The device of Mathew, for instance, is a vertical double gate semiconductor device. (Mathew, Abstract). The "vertical" nature of the device of Mathew is clearly illustrated in, for example, Fig. 9, in which the channel in semiconductor layer 18 is vertically raised from substrate 12 and insulator 14. Lin, in contrast, discloses a FET device having a conventional horizontal channel in substrate 12. As can be plainly seen by a comparison of the figures of Lin and Mathew, the two different devices are structurally significantly different from one another. Accordingly, Applicants submit that one of ordinary skill in the art would not be motivated to apply

specific parameters (such as the width of a spacer) in one device to the other device.

Thus, one of ordinary skill in the art reading Lin would not be motivated to use the spacer width disclosed by Lin as the width of the floating gate disclosed by Mathew

For at least these reasons, Applicants submit that the rejection of claim 1 under 35 U.S.C. § 103(a) based on Mathew and Lin is improper and should be withdrawn. At least by virtue of their dependency on claim 1, the rejections of claims 2, 3, 4, 6, and 7 based on Mathew and Lin are also improper and should be withdrawn.

Claims 2, 3, 4, 6, and 7 recite additional features that are not disclosed by Mathew and Lin, either alone or in combination. Claim 2, for instance, states that the “the first and second sidewall spacers cause a topology of the gate to smoothly transition over the fin and the first and second sidewall spacers.” Mathew does not disclose this feature and indeed, does not even discuss the desirability of causing a topology of the gate to smoothly transition over the fin and the first and second sidewall spacers.

The above arguments regarding claim 2 were made in the previous Amendment. In response, the Examiner states: “Mathew does disclose to one skilled in the art that the first and second sidewall spacers cause a topology of the gate material layer to smoothly transition over the fin and the first and second sidewall spacers. In this regard, note newly cited United States Patent 4,807,013 to Manocha.” (Final Office Action, page 8). Applicants respectfully disagree with the Examiner’s assertion that Mathew discloses this feature of claim 1. An example of a smooth transition of the gate over the first and second sidewall spacers is shown in Applicants figure 5. In contrast, in Fig. 16 of Mathew, for instance, metal layer 66 of Mathew appears to sharply transition from the top of nitride layer 22 to the substrate. Additionally, if the Examiner intends to include Manocha in the rejection under 35 U.S.C. § 103(a), Applicants

request that the Examiner formally reject claim 2 based on Manocha and properly explain how Manocha can be fairly combined with Mathew and Lin.

Claims 16, 18, and 19 additionally stand rejected under 35 U.S.C. § 103(a) based on Mathew and Lin. Applicants respectfully traverse this rejection.

Amended claim 16 additionally recites that the first and second sidewall spacers are formed in a “roughly triangular shape” and the gate is formed over the sidewall spacers “whereby the first and second sidewall spacers cause a topology of the gate to smoothly transition over the fin and the first and second sidewall spacers.” As mentioned above, Mathew does not discuss the desirability of causing a topology of the gate to smoothly transition over a fin and the first and second sidewall spacers, and thus, could not possibly disclose or suggest this feature of claim 16.

In rejecting claim 16, the Examiner relies on Lin for disclosure relating to the claimed width of the sidewall spacers. For reasons similar to those given above with respect to claim 1, Applicants submit that the Examiner has not made a *prima facie* case of obviousness with regard to Mathew and Lin. That is, Mathew discloses a vertical double gate semiconductor device and Lin discloses a more conventional FET device. These two structures would be recognized by one of ordinary skill in the art as different types of semiconductor FET structures and that specific parameters (such as the width of a spacer) in one device could not simply be applied to the other device. Thus, Applicants submit that the Examiner has not made a *prima facie* case of obviousness with regard to Mathew and Lin.

For at least these reasons, Applicants submit that the rejection of claim 16 under 35 U.S.C. § 103(a) based on Mathew and Lin is improper and should be withdrawn. At least by virtue of their dependency on claim 16, the rejection of claims 18 and 19 based on Mathew and Lin are also improper and should be withdrawn.

Conclusion

Applicants respectfully request that this Amendment under 37 C.F.R. § 1.116 be entered by the Examiner, placing claims 1-4, 6, 7, and 16-18 in condition for allowance. Applicants note that the proposed amendments to claim 16 do not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner, since all of the elements and their relationships claimed were substantially included in previously examined claims. Therefore, this Amendment should allow for immediate action by the Examiner.

Furthermore, Applicants respectfully point out that the final action by the Examiner presented some new arguments as to the application of the art against Applicants' invention. It is respectfully submitted that the entering of the Amendment would allow the Applicants to reply to the final rejection and place the application in condition for allowance. Finally, Applicants submit that the entry of the amendment would place the application in better form for appeal, should the Examiner dispute the patentability of the pending claims.

In view of the foregoing amendments and remarks, Applicants respectfully request the Examiner's reconsideration of this application, and the timely allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 CFR 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

HARRITY & SNYDER, L.L.P.

By: 

Brian E. Ledell
Reg. No. 42,784

11240 Waples Mill Road
Suite 300
Fairfax, Virginia 22030
(571) 432-0800

Date: November 22, 2005